Kramer Electronics, Ltd.

USER MANUAL

Model:

VS-81ETH

8x1 Universal CAT 5 Switcher

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1 Introduction

Welcome to Kramer Electronics (since 1981): a world of unique, creative and affordable solutions to the infinite range of problems that confront the video, audio and presentation professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 350-plus different models now appear in 8 Groups[1], which are clearly defined by function.

Congratulations on purchasing your **VS-81ETH** *8x1 Universal CAT 5 Switcher*, which is ideal for the following typical applications:

- Long range graphics distribution for schools, hospitals, security, and stores
- Multimedia, presentation and production applications
- Digital signage

The package includes the following items:

- **VS-81ETH** *8x1 Universal CAT 5 Switcher*
- Power cord and Null-modem adapter
- Windows®-based Kramer control software[2]
- Windows®-based Configuration Manager XPort software and Com Port Redirector
- Kramer **RC-IR1** Infra-Red Remote Control Transmitter[3] (including the required battery and a separate user manual[4])
- This user manual[4]

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1 GROUP 1: Distribution Amplifiers; GROUP 2: Video and Audio Switchers, Matrix Switchers and Controllers; GROUP 3: Video, Audio, VGA/XGA Processors; GROUP 4: Interfaces and Sync Processors; GROUP 5: Twisted Pair Interfaces; GROUP 6: Accessories and Rack Adapters; GROUP 7: Scan Converters and Scalers; and GROUP 8: Cables and Connectors

2 Downloadable from our Web site at http://www.kramerelectronics.com

3 Previously known as the IR-1 / IR-1-01

4 Download up-to-date Kramer user manuals from our Web site at http://www.kramerelectronics.com

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
- Use Kramer high performance high resolution cables[1]

3 Overview

The **VS-81ETH** is a high performance CAT5 8x1 switcher for any kind of digital or analog signal that can even switch digital or analog bi-directional signals.

The **VS-81ETH** *8x1 Universal CAT 5 Switcher*:

- Uses a carefully designed PCB to reduce stubs on high frequency signals
- Stores the last selection in non-volatile memory when the power is switched off, and recalls it when the machine is turned on again
- Has a PANEL LOCK button to prevent tampering with the front panel

Control the **VS-81ETH** using the front panel buttons, or remotely, via:

- RS-485 or RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller
- The Kramer Infra-Red remote control transmitter
- Ethernet
- Remote contact-closure

The **VS-81ETH** is dependable, rugged, and fits into one vertical space (1U) of a standard 19" professional rack. To achieve the best performance:

- Connect only good quality connection cables, thus avoiding interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality and position your Kramer **VS-81ETH** away from moisture, excessive sunlight and dust

4 Your VS-81ETH 8x1 Universal CAT 5 Switcher

Figure 1, Table 1 and Table 2 define the **VS-81ETH** *8x1 Universal CAT 5 Switcher*.

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1 The complete list of Kramer cables is on our Web site at http://www.kramerelectronics.com

KRAMER: SIMPLE CREATIVE TECHNOLOGY

Your VS-81ETH 8x1 Universal CAT 5 Switcher
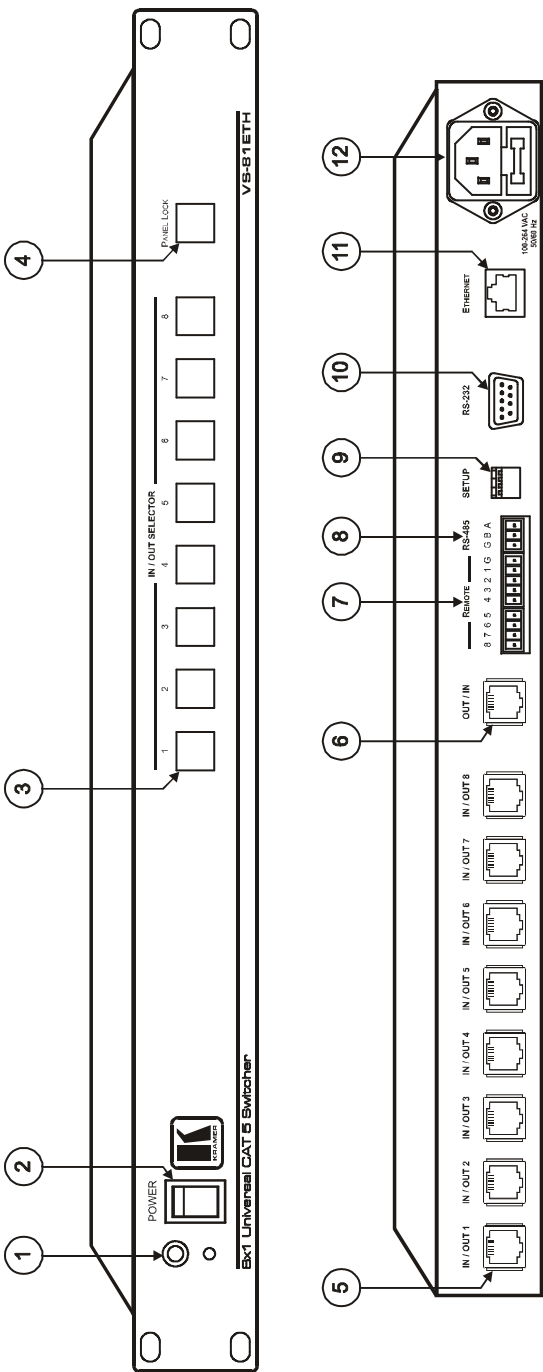
Figure 1: VS-81ETH 8x1 Universal CAT 5 Switcher – Front and Rear View

Table 1: Front Panel VS-81ETH 8x1 Universal CAT 5 Switcher Features

#	Feature	Function
1	IR Receiver	The red LED is illuminated when receiving signals from the Infra-red remote control transmitter
2	*POWER* Switch	Illuminated switch for turning the unit ON or OFF
3	*IN / OUT SELECTOR* Buttons	Select the input port (1 to 8) to switch to the output port, or select the output (1 to 8) to which the input is switched
4	*PANEL LOCK* Button	Disengages the front panel buttons

Table 2: Rear Panel VS-81ETH 8x1 Universal CAT 5 Switcher Features

#	Feature	Function
5	*IN / OUT* CAT5 Connectors	Connect to the digital or analog signal sources/acceptors (from 1 to 8)
6	OUT / IN CAT5 Connector	Connect to the digital or analog signal acceptor/source
7	*REMOTE* Terminal Block	Connects to dry contact switches (see section 5.7)
8	*RS-485* Terminal Block Port	Pin G is for Ground connection[1]; Pins B (-) and A (+) are for RS-485
9	*SETUP* Dipswitches	*SETUP* DIPs 1, 2, 3, 4 are for setting the Machine # (see section 5.4)
10	*RS-232* DB 9F Port	Connects to the PC or the Remote Controller
11	*ETHERNET* Connector	Connects to the PC or other Serial Controller through computer networking
12	Power Connector with Fuse	AC connector enabling power supply to the unit

5 Connecting and Controlling the VS-81ETH

This section describes how to:

- Connect the **VS-81ETH** rear panel (see section 5.1)
- Connect the **VS-81ETH** to a controlling device via RS-232 (see section 5.2), RS-485 (see section 5.3) and/or the Ethernet (see sections 5.5 and 5.6)
- Set the dipswitches (see section 5.4)
- Connect to a remote-connector (see section 5.7)
- Connect several **VS-81ETH** machines (see section 5.8)

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1 Optional. When using a shielded cable for RS-485, it may be advantageous to connect the shield to ground at one end of the cable

5.1 Connecting the VS-81ETH Rear Panel

This section describes how to connect the **VS-81ETH** either as an 8x1 switcher (see section 5.1.1) or in the reverse direction (see section 5.1.2).

5.1.1   Connecting the VS-81ETH as an 8x1 Switcher

To connect the **VS-81ETH**, as the example in Figure 2 illustrates, do the following[1]:

1. Connect a computer graphics source to the XGA INPUT of a **PT-110**[2] *XGA Line Transmitter* and connect[3] the LINE OUTPUT on that **PT-110** to the IN/OUT 1 RJ-45 connector on the **VS-81ETH**.
   Similarly connect another computer graphics source to the XGA INPUT of another **PT-110**[2] *XGA Line Transmitter* and connect[3] LINE OUTPUT on that **PT-110** to the IN/OUT 8 RJ-45 connector on the **VS-81ETH**. You can connect up to 8 inputs[4].

2. On the **VS-81ETH**, connect[3] the OUT/IN connector to the LINE IN RJ-45 connector on a **TP-120**[2] *XGA Line Receiver* unit, and connect the XGA OUT connector on that **TP-120** unit to the acceptor (for example, a projector).

3. Set the dipswitches (see section 5.4).

4. Connect a PC and/or controller (if required) to the RS-232 port (see section 5.2) and/or RS-485 port (see section 5.3).

5. Connect the power cord[5].

To switch an input to the output, press an IN/OUT SELECTOR button.

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1 Switch OFF the power on each device before connecting it to your VS-81ETH. After connecting your VS-81ETH, switch on its power and then switch on the power on each device

2 Refer to the separate user manual PT-110, WP-110, TP-120, which can be downloaded from the Internet at this URL: http://www.kramerelectronics.com

3 Using an STP cable with CAT5 connectors at both ends, with a range of more than 300ft (>100m), see section 5.1.3

4 You do not have to connect all 8 inputs, connect only those that are required

5 We recommend that you use only the power cord that is supplied with this machine
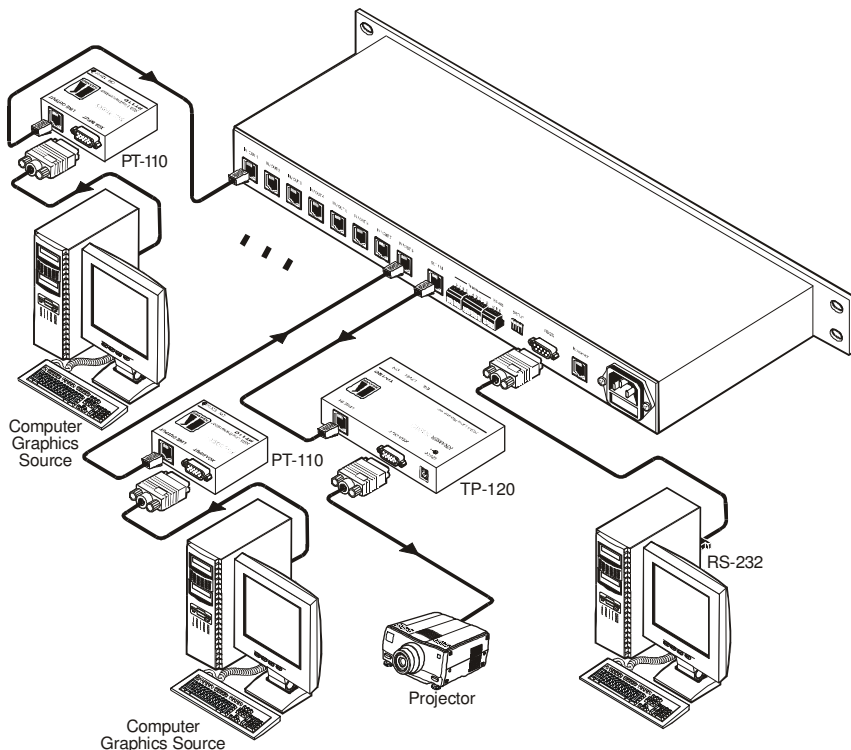
Figure 2: Connecting the VS-81ETH Universal CAT 5 Switcher

5.1.2 Connecting the VS-81ETH in the Reverse Direction

You may connect the **VS-81ETH** in the reverse direction so that the input signal from the OUT/IN connector is transmitted to any of the IN/OUT connectors. You can only route this source to one IN/OUT channel at a time[1].

To connect the **VS-81ETH**, in the reverse direction, do the following[2]:

1. Connect the VGA/UXGA computer graphics source to the XGA INPUT of a **PT-110**[3] *XGA Line Transmitter* and connect[4] the LINE OUTPUT on that **PT-110** to the OUT/IN RJ-45 connector on the **VS-81ETH**.

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1 Select by pressing the desired IN/OUT button

2 Switch OFF the power on each device before connecting it to your VS-81ETH. After connecting your VS-81ETH, switch on its power and then switch on the power on each device

3 Refer to the separate user manual PT-110, WP-110, TP-120, which can be downloaded from the Internet at this URL: http://www.kramerelectronics.com

4 Using an STP cable with CAT5 connectors at both ends, with a range of more than 300ft (>100m), see section 5.1.3

2. On the **VS-81ETH**, connect[3] the IN/OUT connector to the LINE IN RJ-45 connector on a **TP-120**[1] *XGA Line Receiver* unit, and connect the XGA OUT connector on that **TP-120** unit to the acceptor (for example, a projector). You can connect up to 8 outputs[2].

3. Set the dipswitches (see section 5.5).

4. Connect a PC and/or controller (if required) to the RS-232 port (see section 5.2) and/or RS-485 port (see section 5.3).

5. Connect the power cord[3].

To transmit the signal from the OUT/IN connector to a device connected to the IN/OUT connector, press the appropriate IN/OUT button.
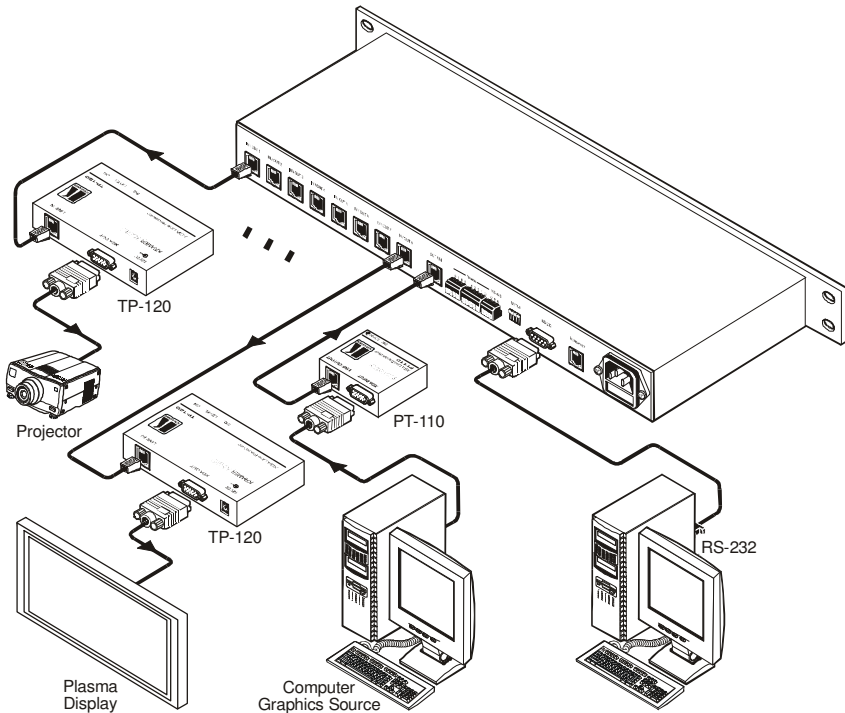
Figure 3: Connecting the VS-81ETH in the Reverse Direction

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1 Refer to the separate user manual PT-110, WP-110, TP-120, which can be downloaded from the Internet at this URL: http://www.kramerelectronics.com

2 You do not have to connect all 8 inputs, connect only those that are required

3 We recommend that you use only the power cord that is supplied with this machine

5.1.3 Wiring the CAT5 LINE IN / LINE OUT RJ-45 Connectors

Table 3 and Figure 4 define the CAT5 PINOUT, using a straight pin-to-pin cable with RJ-45 connectors:

Figure 4: CAT5 PINOUT

Table 3: CAT5 PINOUT

EIA /TIA 568A	
PIN	**Wire Color**
1	Green / White
2	Green
3	Orange / White
4	Blue
5	Blue / White
6	Orange
7	Brown / White
8	Brown
Pair 1	4 and 5
Pair 2	3 and 6
Pair 3	1 and 2
Pair 4	7 and 8

EIA /TIA 568B	
PIN	**Wire Color**
1	Orange / White
2	Orange
3	Green / White
4	Blue
5	Blue / White
6	Green
7	Brown / White
8	Brown
Pair 1	4 and 5
Pair 2	1 and 2
Pair 3	3 and 6
Pair 4	7 and 8

5.2 Controlling via RS-232 (for example, using a PC)

To connect a PC to the **VS-81ETH** unit, using the Null-modem adapter provided *with* the machine (recommended):

- Connect the RS-232 DB9 rear panel port on the Master **VS-81ETH** unit to the Null-modem adapter and connect the Null-modem adapter with a 9-wire flat cable to the RS-232 DB9 port on your PC

To connect a PC to the **VS-81ETH** unit, *without* using a Null-modem adapter:

- Connect the RS-232 DB9 port on your PC to the RS-232 DB9 rear panel port on the Master **VS-81ETH** unit, as Figure 5 illustrates (depending on whether the PC has a 9-pin or 25-pin connector)
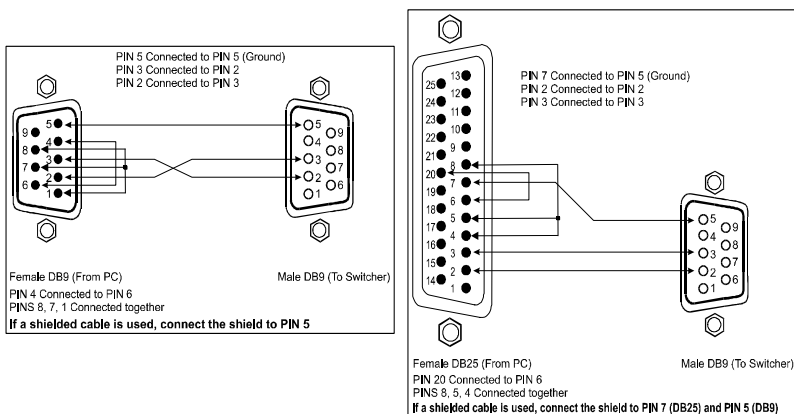
Figure 5: Connecting a PC without using a Null-modem Adapter

5.3 Controlling via RS-485

You can control a **VS-81ETH** unit via an RS-485 controller, for example, a PC (equipped with an RS-485 interface) or a Master Programmable Remote Control system such as the Kramer **RC-3000**[1].

To connect an **RC-3000** to a **VS-81ETH** unit (see Figure 6):

1. Connect the RS-485 terminal block port on the **RC-3000** to the RS-485 port on the **VS-81ETH** unit, as follows:

   - Connect the "A" (+) PIN on the RS-485 rear panel port of the **RC-3000** to the "A" (+) PIN on the RS-485 rear panel port of the **VS-81ETH** unit
   - Connect the "B" (-) PIN on the RS-485 rear panel port of the **RC-3000** to the "B" (-) PIN on the RS-485 rear panel port of the **VS-81ETH** unit
   - If shielded twisted pair cable is used, the shield may be connected to the "G" (Ground) PIN on one of the units (for example, on the **RC-3000**)

2. Set the **VS-81ETH** unit as Machine # 1, according to Table 4 (that is, DIP 1, DIP 2, DIP 3, and DIP 4 are set to OFF).
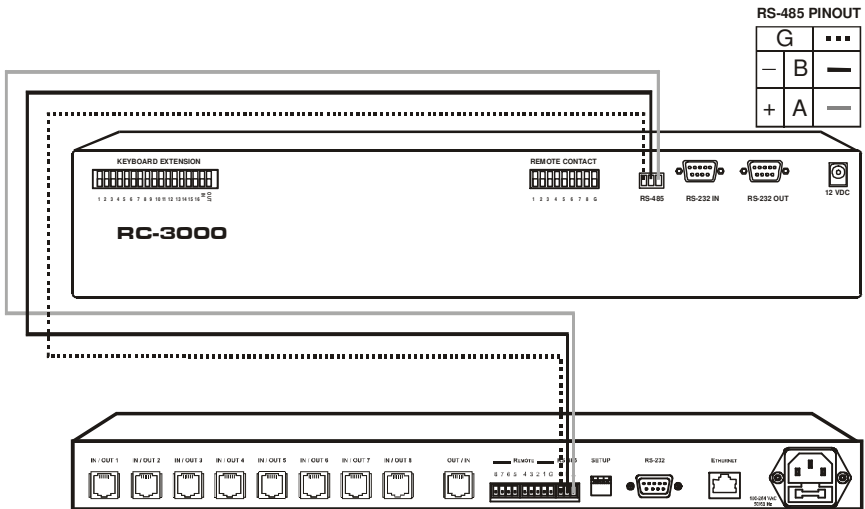
Figure 6: Controlling via RS-485 (for example, using an RC-3000)

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1 Previously known as the VS-3000

5.4 Setting the Dipswitches

By default, all dipswitches are set to OFF. Figure 7 illustrates the **VS-81ETH** dipswitches:

SETUP
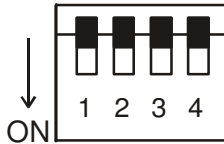
Figure 7: VS-81ETH SETUP Dipswitches

5.4.1 Setting the Machine # Dipswitches

The Machine # (dipswitches 1 to 4) determines the position of a **VS-81ETH** unit, specifying which **VS-81ETH** unit is being controlled when several **VS-81ETH** units connect to a PC or serial controller. Set the Machine # on a **VS-81ETH** unit via SETUP DIPS 1, 2, 3 and 4, according to Table 4.

When using a standalone **VS-81ETH** unit, set the Machine # to 1. When connecting more than one **VS-81ETH** unit, set the first machine (the Master) that is closest to the PC, as Machine # 1 (dipswitches are set to OFF).

Table 4: Machine # Dipswitch Settings

Mach. #	DIP 1	DIP 2	DIP 3	DIP 4
1	OFF	OFF	OFF	OFF
2	OFF	OFF	OFF	ON
3	OFF	OFF	ON	OFF
4	OFF	OFF	ON	ON
5	OFF	ON	OFF	OFF
6	OFF	ON	OFF	ON
7	OFF	ON	ON	OFF
8	OFF	ON	ON	ON

5.5 Control Configuration via the Ethernet Port

To control several units via the Ethernet, connect the Master unit (Machine # 1) via the Ethernet port to the LAN port of your PC. Using your PC, initially configure the settings as described in section 5.6.

5.6 Setting the Ethernet Port and Utilities

To control your **VS-81ETH** via the Ethernet, perform an initial configuration as follows:

1. Connect the Ethernet port of the **VS-81ETH** to the LAN port of your PC (see section 5.6.1).

2. Configure your Ethernet port (see section 5.6.2).

3. Install the COM Port Redirector to control the **VS-81ETH** (see section 5.6.5).

5.6.1 Connecting the VS-81ETH Ethernet Port

You can connect the Ethernet port either via a crossover cable (see section 5.6.1.1) or a straight through cable (see section 5.6.1.2).

5.6.1.1 Connecting via a Crossover Cable

Connect the Ethernet port of the **VS-81ETH** to the LAN port on your PC, via a crossover cable with RJ-45 connectors, as Table 5 defines.

Table 5: Crossover Cable RJ-45 PINOUT

Side 1		Side 2	
PIN	**Wire Color**	**PIN**	**Wire Color**
1	White-orange	1	White-green
2	Orange	2	Green
3	White-green	3	White-orange
4	Blue	4	Blue
5	White-blue	5	White-blue
6	Green	6	Orange
7	White-brown	7	White-brown
8	Brown	8	Brown

This type of connection is recommended for identification of the factory default IP Address of the **VS-81ETH** during the initial configuration

After connecting the Ethernet port, configure your PC as follows:

1. Right-click the My Network Places icon on your desktop.

2. Select Properties.

3. Right-click Local Area Connection Properties.

4. Select Properties.
   The Local Area Connection Properties window appears.

5. Select **Internet Protocol (TCP/IP)** and click the Properties Button (see Figure 8).
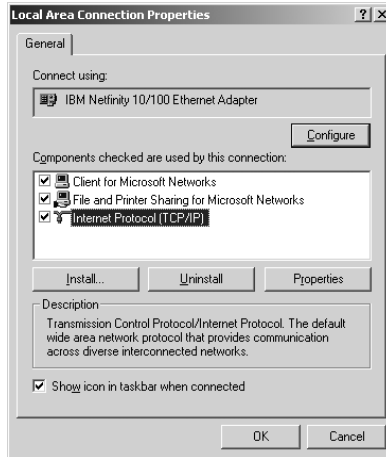
Figure 8: Local Area Connection Properties Window

6. Select **Use the following IP Address**, and fill in the details as shown in Figure 9.

7. Click OK.
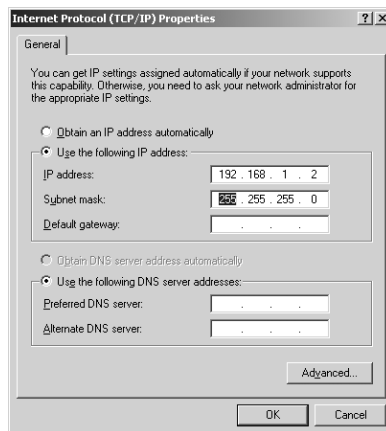
Figure 9: Internet Protocol (TCP/IP) Properties Window

5.6.1.2 Connecting via a Straight-Through Cable

If connecting the Ethernet port of the **VS-81ETH** to the LAN port on a network hub or network router, use a straight-through cable with RJ-45 connectors, as Table 6 defines:

Table 6: Straight-through Cable RJ-45 PINOUT

Side 1		Side 2	
PIN	Wire Color	PIN	Wire Color
1	White-orange	1	White-orange
2	Orange	2	Orange
3	White-green	3	White-green
4	Blue	4	Blue
5	White-blue	5	White-blue
6	Green	6	Green
7	White-brown	7	White-brown
8	Brown	8	Brown

5.6.2 Installing and Running the XPort Configuration Software

To configure the Ethernet port, you have to install and run the XPort configuration software.

It is important to consider the following points before logging into and configuring the Ethernet port:

- The **VS-81ETH** IP address must be configured before a network connection is available
- Only one person at a time may be logged into the network port. This eliminates the possibility of several people simultaneously attempting to configure the Device Server
- Network port logins can be disabled. The system manager will not be able to access the unit. This port can also be password protected

5.6.2.1 Install XPort™ Installer

To install the XPort™ Installer, do the following:

1. Insert the product CD into your CD-ROM drive.

2. Run the XPort installer setup.

3. Respond to the installation wizard prompts.

4. Restart your system.

5.6.2.2 Run XPort™ Installer

Click the **Start** button on the Task Bar and select **Programs\XPort Installer\XPort Installer**. The XPort™ Installer main dialog box displays (Figure 10).
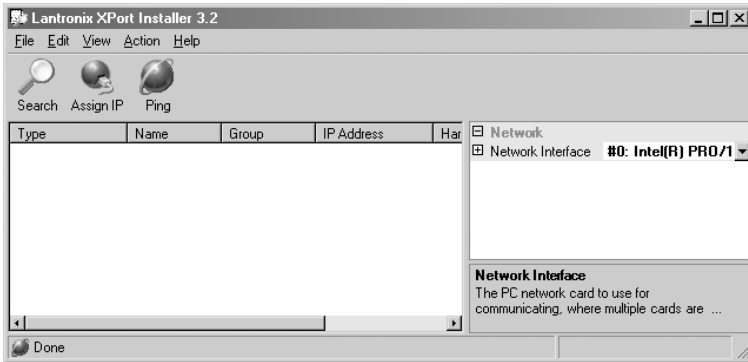
Figure 10: XPort™ Installer Main Dialog Box

To search for devices, click the **Search** icon or select **Search Network** from the Action menu.

5.6.2.3 Assign IP Address

Figure 11 shows a device found on the network, with the IP addresses assigned at the factory. The Hardware Address is an individual permanent address assigned to a particular device on the network. The Hardware Address can be found on the product label inside the unit.

Note: Click on a device to view its attributes
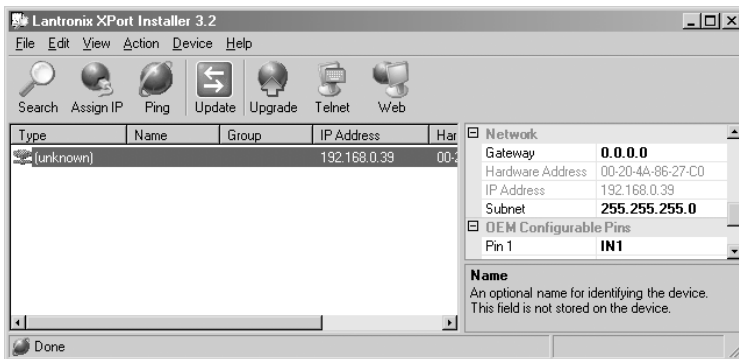
Figure 11: Device Found on the Network

To change the IP address, first select the device from the list, then click the **Assign IP** icon or select **Assign IP Address** from the Action menu. The hardware address and IP address are loaded into the Assign IP Address dialog box (Figure 12).
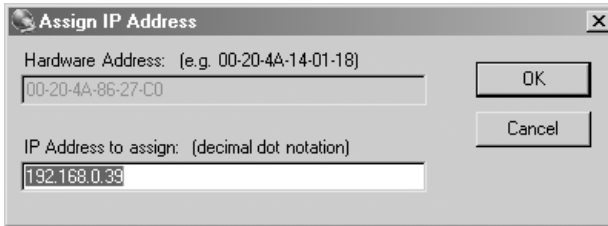
Figure 12: IP Address Assignment Dialog Box

Enter the new IP Address and click **OK**. The new IP Address will appear in the main window.

5.6.2.4 Test the IP Address

To test the IP Address, do the following:

1. Select the device from the main window list.

2. Click the **Ping** icon or select **Ping** from the Action menu. The Ping Device dialog box shows the IP Address of the selected device.

3. Click the **Ping** button and the results will be displayed in the Status window. Use the **Clear Status** button to clear the window so you can ping the device again.

4. Click the **Close** button to close the dialog box and return to the main window.

Note: If you do not receive "Reply" messages, make sure the unit is properly attached to the network and that the IP address assigned is valid for the particular network segment you are working with. If you are not sure, check with your Systems Administrator

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5.6.3 Configuring the Ethernet Port

You must configure the Ethernet port so that it can communicate on a network with your serial device. For example, you must set the way the unit will respond to serial and network traffic, how it will handle serial packets, and when to start or close a connection. You can configure your unit locally or remotely using the following procedures:

- Use the XPort™ Installer to configure the unit. Some features are only available through the XPort™ Installer menus
- Use a standard Web browser to access the unit's internal Web pages and configure the unit over the network (see section 5.6.4)
  This is the easiest and preferred method

Make sure that the Java™ 2 Runtime Environment (Standard Edition Version 1.4.1) software is installed on your PC. If not, download it from: http://java.sun.com

The unit's configuration is stored in non-volatile memory and is retained without power. You can change the configuration at any time. The unit performs a reset after the configuration has been changed and stored.

5.6.4 Using the Web Manager Page

To configure the Ethernet port via a Web browser, first click one of the devices listed in the window, and then click the **Web** icon. The Web-Manager window now displays in your browser.
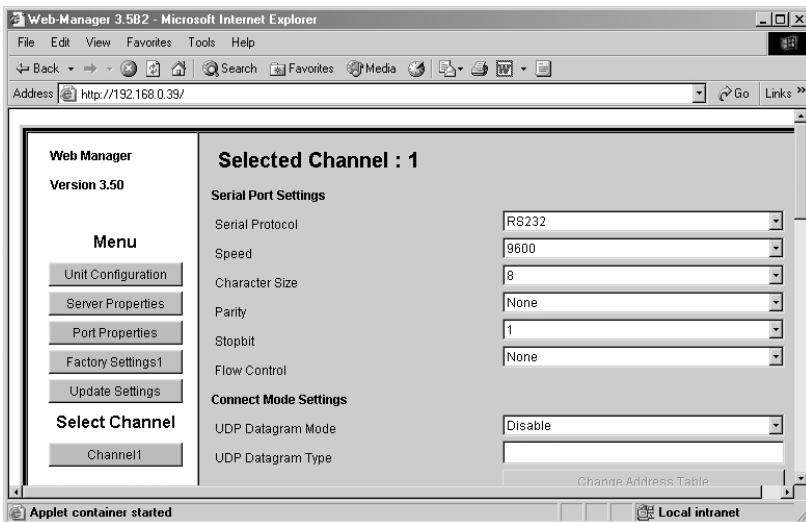
Figure 13: Ethernet Port Web-Manager

Table 7 describes the Web Manager window buttons.

Table 7: Web Manager Window Buttons

Button	Function
Unit Configuration	Press to enter the Server Configuration and the Port Configuration settings (section 5.6.4.1)
Server Properties	Press to enter the Server Properties and change the server properties by editing any of the fields (section 5.6.4.2)
Port Properties	Press to enter the Port Properties and modify them
Factory Settings1	Press to set to factory default settings
Update Settings	Press to update settings
Channel 1	Disabled

When in the Web Manager window:

1. Use the menu buttons to navigate to sub pages where you can configure server settings. See explanations of the configuration parameters in the following sections.

2. When you are finished, click the **Update Settings** button to save your settings.

5.6.4.1 Unit Configuration Button

Click the **Unit Configuration** button to display the following dialog box (Figure 14). This page contains the Server Configuration and the Port Configuration settings. These are static settings read from the device.
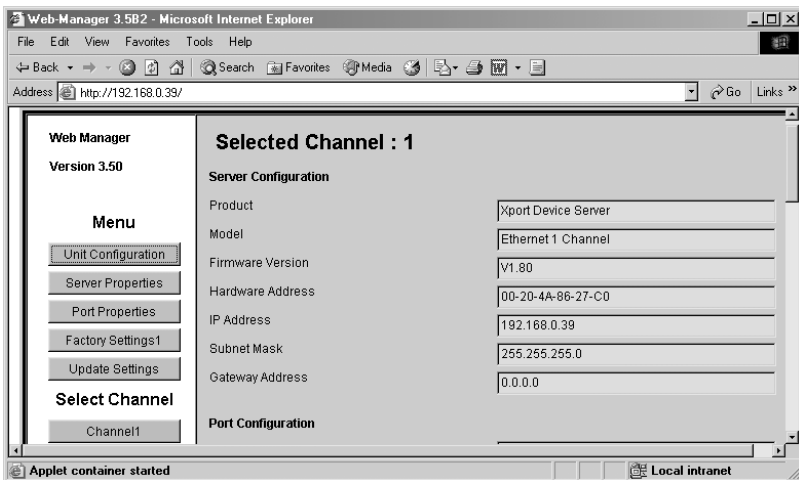
Figure 14: Server Configuration in the Unit Configuration Window

Figure 14 and Figure 15 show the information available in the Unit Configuration window.

Port Configuration	
Local Port Number	10001
Remote Port Number	
Serial Port Speed	9600
Flow Control	00
Interface Mode	4C
Connect Mode	C0
Disconnect Mode	00
Flush Mode	00
Pack Control	00
UDP Datagram Type	Not Supported By These Settings

Figure 15: Port Configuration in the Unit Configuration Window

5.6.4.2 Server Properties Button

Click the **Server Properties** button to display the following dialog box (see Figure 16).

You can change the server properties by editing any of the fields. Hold the cursor over one of the fields to display Help messages.
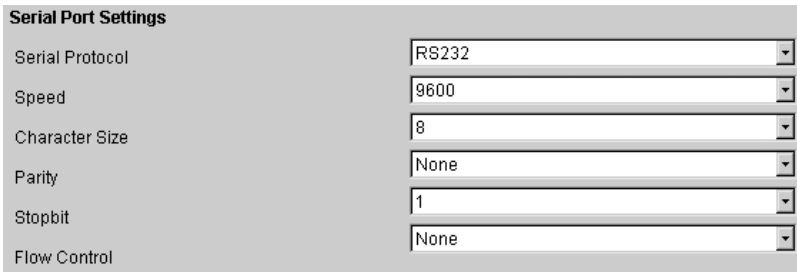
Server Properties	
IP Address	192.168.0.39
Subnet Mask	255.255.255.0
Gateway Address	0.0.0.0
High Performance	Disable
Telnet Password	XXXX

Figure 16: Server Properties in the Unit Configuration Window

- Changing the IP address will require you to enter the new IP address in the browser to reload the page
- In the Telnet Password field, enter a password to prevent unauthorized access to the Setup Mode via a Telnet connection to port 9999. The password is limited to 4 characters. (An enhanced password setting of 16 characters is available under Security Settings on the Telnet Setup Mode window)

5.6.4.3 Port Properties Button

Click the **Port Properties** button to display the following dialog boxes. Make sure that the Serial Port Settings window is set[1] according to Figure 17.
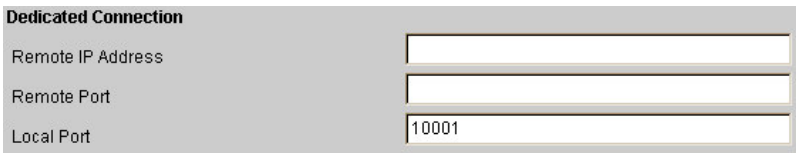
Figure 17: Serial Port Settings Window

Make sure that the Local Port in the Dedicated Connection window is set according to Figure 18.
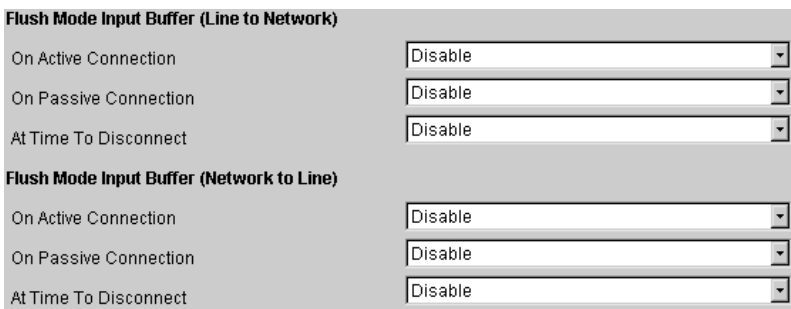
Figure 18: Dedicated Connection Window

Make sure that the Flush Mode Input buffer window is set according to Figure 19.

Figure 19: Flush Mode Input Buffer Window

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1 You can change the server properties by selecting the desired properties from the drop down list

5.6.5 Controlling a Machine using the Com Port Redirector

The Com Port Redirector allows any PC running Windows to use ports on a network server as if they were connected directly to the PC. The Redirector creates a virtual COM port within Windows, which for most purposes acts just like the selected serial port on the server.

5.6.5.1 Installing the Com Port Redirector

To install the Com Port Redirector, do the following:

1. Perform the appropriate step to start the installation:
    - If the Com Port Redirector is on a CD-ROM, insert the CD-ROM into the computer's CD-ROM drive
    - If you downloaded the Com Port Redirector, double-click the downloaded file

    Either step displays the Redirector - Welcome screen in Figure 20

Figure 20: Com Port Redirector Welcome Screen

2. Click the **Continue** button and follow the on-screen installation instructions.

3. After installation, the Setup Complete dialog box appears (Figure 21).
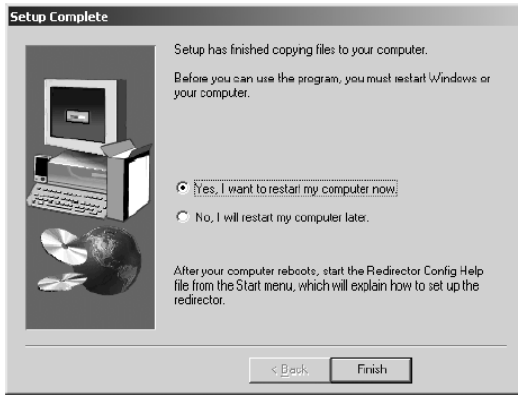
Figure 21: Setup Complete Dialog Box

4. Click **Finish** to complete the installation and restart your computer.

5. Click the **Start** button in the Windows Taskbar, point to **Programs**, point to **Lantronix Redirector**, and click **Configuration**. The Com Port Redirector Configuration window appears (see Figure 22).
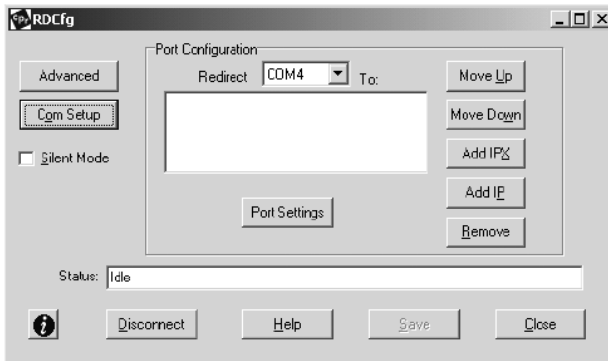
Figure 22: Com Port Redirector Configuration Window

6. Click the **Com Setup** button. A Port Setup dialog box appears (Figure 23), with the first logical communications port checked. The physical communication ports on the computer where the Com Port Redirector is installed are grayed-out and unavailable. In Figure 23, these are Com1 through Com3. Your unavailable communication ports may vary.
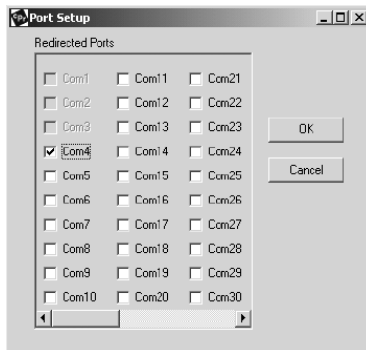
Figure 23: Port Setup Window

7. Click all the logical ports to which the PC will be redirected.
    A checkmark appears next to each logical port selected. Each port
    selected will be available from the **Redirect To** drop-down list in the
    Com Port Redirector Configuration window (see Figure 22).

8. To deselect a port, click it again to remove the checkmark next to it.
    Removing the checkmark indicates that the port will not be available
    from the **Redirect To** drop-down list.

9. When finished, click **OK**.

Note: After you use the Port Setup dialog box to add or remove Com ports, restart
your computer

5.6.5.2 Configuring the Com Port Redirector

Com Port Redirector is a software utility for network-enabling legacy software
applications that do not have network support. Com Port Redirector installs
virtual Windows® communication ports. These virtual communication ports are
redirected over a network to the serial port of the **VS-81ETH**.

Configuration Guidelines

Observe the following general guidelines when preparing the **VS-81ETH** for
use with the Com Port Redirector:

• The machine to which the Com Port Redirector will connect must have an
  IP address

• The PC running the Com Port Redirector must have a good network
  connection to the **VS-81ETH**

- If redirecting over a Wide Area Network (WAN), both the PC and the **VS-81ETH** must have a correct gateway address configured in their TCP/IP[1] settings

Redirector Configuration

Before using the Com Port Redirector, you have to configure the **VS-81ETH** Ethernet port. To do so, do the following:

- Assign a compatible IP address to the device server
- Set the serial settings (baud rate, parity, flow control, data bits)
- Set the port number to **10001** (recommended)

For specific instructions, see section 5.6.1.

To configure the Com Port Director:

1. Click the **Start** button in the Windows Taskbar, point to **Programs**, point to **Lantronix Redirector**, and click **Configuration**. The Com Port Redirector Configuration window appears (see Figure 22).

2. Using the **Redirect To** drop-down list at the top of the Com Port Redirector Configuration window, click a redirected Com port.

3. Click the **Add IP** button. The IP Service Setup dialog box appears (see Figure 24).
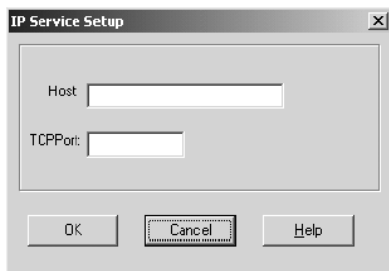
Figure 24: IP Service Setup Dialog Box

4. In the **Host** field, enter the IP address of the **VS-81ETH**.

5. In the **TCPPort** field, type **10001** for Channel 1 (according to the local port, configured in the **VS-81ETH** unit).

6. Click **OK**.

7. Click the **Port Settings** button. The Port Settings dialog box appears. Figure 25 shows the Port Settings dialog box and Table 8 describes its settings.

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1 TCP/IP is Transmission Control Protocol/Internet Protocol

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8. Check **Raw Mode**.
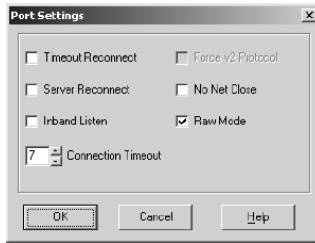
Figure 25: Port Settings Window

9. Click **OK**.

10. Click the **Save** button (see Figure 22).

11. Click the **Close** button (see Figure 22).

Table 8: Port Settings Description

Setting	Description
Timeout Reconnect	If checked, the Com Port Redirector re-establishes the connection if the connection times out[1]
Server Reconnect	If checked, the Com Port Redirector re-establishes the connection if the server closes it[1]
Inband Listen	If checked, the Com Port Redirector uses the inband redirector protocol on inbound connections from a **VS-81ETH**. This protocol allows settings like modem signals, baud rate and parity to be exchanged between Com Port Redirector and the server
Connection Timeout	Specifies the maximum number of seconds that the Com Port Redirector waits for a connection to be made before giving up on this attempt. If Timeout Reconnect is enabled, each connection attempt lasts this long. If Timeout Reconnect is disabled, the connection attempt fails after this interval and no more attempts are made
Force v2 Protocol	N/A
No Net Close	If checked, prevents the network connection from being dropped when the communications application is closed. To drop the connection, click the Disconnect button in the Com Port Redirector Configuration window. This allows applications to close and reopen ports, without waiting for the network connection to be reestablished and negotiated
Raw Mode	If checked, Raw Mode forms a raw TCP connection to the server's serial port, accelerating the connection between the communications application and the server, without sending configuration or status information from the PC to the server. When using Raw Mode, configure the Com Port Redirector and your **VS-81ETH** to use the same port number

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1 When auto-reconnecting, the Com Port Redirector tries to reconnect until the connection succeeds or you click the Cancel button in the pop-up connection dialog box. If the port was closed by the communications application or by clicking Disconnect, the Com Port Redirector does not try to auto-reconnect

Verify Connectivity

After configuring the Com Port Redirector and the **VS-81ETH**, use a
terminal emulation program such as HyperTerminal to verify connectivity
from the Com Port Redirector to the **VS-81ETH**. To verify connectivity
between the Com Port Redirector and the **VS-81ETH** using HyperTerminal:

1. Click the **Start** button in the Windows Taskbar, point to **Programs**,
   point to **Accessories**, point to **Communications**, and click
   HyperTerminal.

2. Open a new session to the virtual Com port configured to connect to the
   device server.

3. When the HyperTerminal window opens, a pop-up window displays:
   Attempting to connect to service.
   If this message is replaced by: *Successfully redirected to service*, the
   connection from the Com Port Redirector to the device server was
   successful.
   However, if the message is replaced by *Failed to connect to any service*,
   the connection failed. Ensure your settings are correct.

4. To hide the pop-up window, check **Silent Mode** on the Com Port
   Redirector Configuration window (Figure 26).

Figure 26: Silent Mode Checked in the RDCfg Window

5.6.6 Using the Com Port Redirector

Observe the following general guidelines when using the Com Port Redirector:

- Do not run the Com Port Redirector with other software that installs a
  virtual com port
- Do not run the Com Port Redirector with other Com Port Redirection
  software on the same PC

5.7 Connecting the REMOTE Connector

You can connect contact-closure switches to the REMOTE terminal block connector, as Figure 27 describes. A remote unit can consist of mechanical switches[1] with a common wire for ground[2]. When you connect[3] the appropriate REMOTE terminal block connector PIN to the REMOTE terminal block connector Ground PIN, the **VS-81ETH** will route the appropriate IN/OUT signal to the OUT/IN acceptor[4].
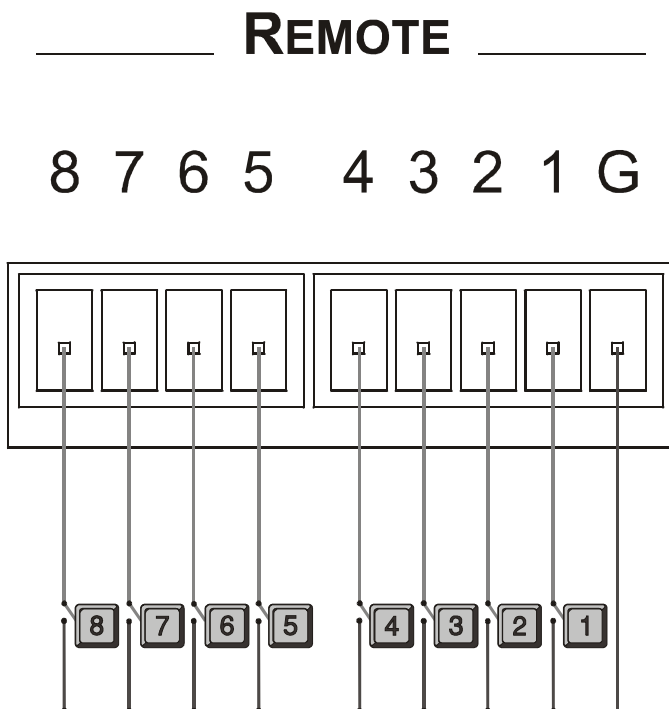
Figure 27: Connecting a Remote Mechanical Switcher Unit to the VS-81ETH

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1 The remote unit can have up to 8 push-buttons corresponding to the front panel IN/OUT buttons

2 Providing control over a distance up to hundreds of meters

3 Momentary connection. After the connection has been made, the new status is selected – as in the case when a front panel switch is pressed

4 To route IN/OUT 1, connect PIN 1 to the Ground PIN. To route IN/OUT 2, connect PIN 2 to the Ground PIN. To route IN/OUT 3, connect PIN 3 to the Ground PIN, and so on

5.8 Cascading Machines

You can cascade up to 8 **VS-81ETH** units with control from a PC or serial controller (see Figure 28).

To cascade up to 8 individual **VS-81ETH** units, via RS-232 and RS-485, do the following:

1. Connect the VGA/UXGA sources and acceptors, as section 5.1 describes.

2. Connect the RS-232 port[1] on the first **VS-81ETH** unit to the PC using the Null-modem adapter provided with the machine (recommended), as section 5.2 describes.

3. Connect the RS-485 terminal block port on the first unit to the RS-485 port on the second **VS-81ETH** unit and so on, connecting all the RS-485 ports.

4. Set the Machine # dipswitches, as section 5.5 describes. Set the first **VS-81ETH** unit as Machine # 1 and the following 7 **VS-81ETH** units as Machine # 2 to Machine # 8, according to Table 4.
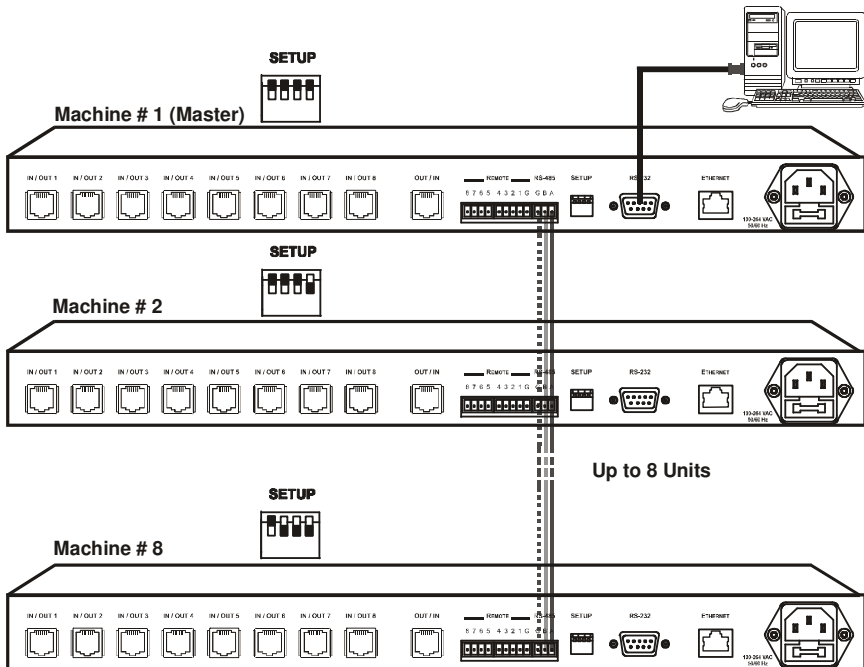
Figure 28: Control Configuration via RS-232 and RS-485

1 Alternatively, the RS-485 port could be used for PC control (instead of RS-232)

6 Operating the VS-81ETH

You can operate your **VS-81ETH** via:

- The front panel buttons
- RS-232/RS-485 serial commands transmitted by a touch screen system, PC, or other serial controller
- The Kramer **RC-IR1** Infra-Red Remote Control Transmitter
- The Ethernet

6.1 Using the Front Panel Button

You can use the front panel buttons to select the input to switch to the output in a 8x1 switcher configuration, or to transmit the input signal via the OUT/IN connector to an IN/OUT connector (in a reverse direction configuration).

6.2 Locking the Front Panel

To prevent changing the settings accidentally or tampering with the unit via the front panel buttons, lock[1] your **VS-81ETH**. Unlocking releases the protection mechanism.

To lock the **VS-81ETH**:

- Press the LOCK button for more than two seconds, until the LOCK button is illuminated
  The front panel is locked. Pressing a button will have no effect other than causing the LOCK button to blink[2]

To unlock the **VS-81ETH**:

- Press the illuminated LOCK button for more than two seconds, until the LOCK button is no longer illuminated
  The front panel unlocks

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1 Even though the front panel is locked you can still operate via RS-232 or RS-485, as well as via the Kramer RC-IR1 Infra-Red Remote Control Transmitter

2 Warning that you need to unlock to regain control via the front panel

7   Technical Specifications

Table 9 includes the technical specifications:

Table 9: Technical Specifications[1] of the VS-81ETH 8x1 Universal CAT 5 Switcher

INPUTS:	8 RJ45 CAT-5 ports
OUTPUTS:	1 RJ45 CAT-5 port
BANDWIDTH (-3dB):	3 Gbits/sec
CONTROLS:	9 illuminated front-panel touch switches, RS-232, RS-485, contact closure, Ethernet, IR
POWER SOURCE:	8 Watts (maximum) 100-264 VAC, 50/60Hz
DIMENSIONS:	19-inch (W), 7-inch (D), 1U (H)
WEIGHT:	2.5kg (5.5lbs) approx.
ACCESSORIES:	Power cord, Null modem adapter, Windows®-based control software, Windows®-based Configuration Manager XPort software and Com Port Redirector

8   Table of Hex Codes for Serial Communication

Table 10 lists the Hex values for a single machine (*MACHINE # 1*):

Table 10: VS-81ETH Hex Codes for Switching via RS-232/RS-485

IN/OUT 1	IN/OUT 2	IN/OUT 3	IN/OUT 4	IN/OUT 5	IN/OUT 6	IN/OUT 7	IN/OUT 8
01	01	01	01	01	01	01	01
81	82	83	84	85	86	87	88
81	81	81	81	81	81	81	81
81	81	81	81	81	81	81	81

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1 Specifications are subject to change without notice

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9   Kramer Protocol 2000[1]

The **VS-81ETH** is compatible with Kramer's Protocol 2000 (version 0.46) (below). This RS-232/RS-485 communication protocol uses four bytes of information as defined below. For RS-232, a null-modem connection between the machine and controller is used. The default data rate is 9600 baud, with no parity, 8 data bits and 1 stop bit.

Table 11: Protocol Definitions

MSB   LSB

	DESTI-NATION	INSTRUCTION					
0	D	N5	N4	N3	N2	N1	N0
7	6	5	4	3	2	1	0

1st byte

	INPUT						
1	I6	I5	I4	I3	I2	I1	I0
7	6	5	4	3	2	1	0

2nd byte

	OUTPUT						
1	O6	O5	O4	O3	O2	O1	O0
7	6	5	4	3	2	1	0

3rd byte

			MACHINE NUMBER				
1	OVR	X	M4	M3	M2	M1	M0
7	6	5	4	3	2	1	0

4th byte

1st BYTE: Bit 7 – Defined as 0.
D – "DESTINATION":   0 - for sending information to the switchers (from the PC);
1 - for sending to the PC (from the switcher).
N5…N0 – "INSTRUCTION"
The function that is to be performed by the switcher(s) is defined by the INSTRUCTION (6 bits). Similarly, if a function is performed via the machine's keyboard, then these bits are set with the INSTRUCTION NO., which was performed. The instruction codes are defined according to the table below (INSTRUCTION NO. is the value to be set for N5…N0).

2nd BYTE: Bit 7 – Defined as 1.
                                     I6…I0 – "INPUT".
When switching (ie. instruction codes 1 and 2), the INPUT (7 bits) is set as the input number which is to be switched. Similarly, if switching is done via the machine's front-panel, then these bits are set with the INPUT NUMBER which was switched. For other operations, these bits are defined according to the table.

3rd BYTE: Bit 7 – Defined as 1.
                                     O6…O0 – "OUTPUT".
When switching (ie. instruction codes 1 and 2), the OUTPUT (7 bits) is set as the output number which is to be switched. Similarly, if switching is done via the machine's front-panel, then these bits are set with the OUTPUT NUMBER which was switched. For other operations, these bits are defined according to the table.

4th BYTE: Bit 7 – Defined as 1.
                      Bit 5 – Don't care.
                      OVR – Machine number override.
                      M4…M0 – MACHINE NUMBER.
Used to address machines in a system via their machine numbers. When several machines are controlled from a single serial port, they are usually configured together with each machine having an individual machine number. If the OVR bit is set, then all machine numbers will accept (implement) the command, and the addressed machine will reply.

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1 You can download our user-friendly "Software for Calculating Hex Codes for Protocol 2000" from the technical support section on our Web site at: http://www.kramerelectronics.com

For a single machine controlled via the serial port, always set M4…M0 = 1, and make sure that the machine itself is configured as MACHINE NUMBER = 1.

Table 12: Instruction Codes for Protocol 2000

Note: All values in the table are decimal, unless otherwise stated.

INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTE
#	DESCRIPTION	INPUT	OUTPUT	
0	RESET VIDEO	0	0	1
1	SWITCH VIDEO	Set equal to video input which is to be switched (0 = disconnect)	Set equal to video output which is to be switched (0 = to all the outputs)	2, 15
2	SWITCH AUDIO	Set equal to audio input which is to be switched (0 = disconnect)	Set equal to audio output which is to be switched (0 = to all the outputs)	2
3	STORE VIDEO STATUS	Set as SETUP #	0 - to store 1 - to delete	2, 3, 15
4	RECALL VIDEO STATUS	Set as SETUP #	0	2, 3, 15
5	REQUEST STATUS OF A VIDEO OUTPUT	Set as SETUP #	Equal to output number whose status is reqd	4, 3
6	REQUEST STATUS OF AN AUDIO OUTPUT	Set as SETUP #	Equal to output number whose status is reqd	4, 3
7	VIS SOURCE	Set as input # when OUTPUT byte = 6; OR set as output # when OUTPUT byte = 7; OR set as blank period (in steps of 25ms) when OUTPUT byte = 32; OR set = 0. *****	0 - No VIS (immediate) 1 - Input # 1 2 - External digital sync 3 - External analog sync 4 - Dynamic sync 5 - Inter-machine sync 6 - Input # (INPUT byte) 7 - Output #(INPUT byte) 8 - User-defined sync 32 - RGBHV seamless switching 64 - Set for delayed switch 65 - Execute delayed switch 66 - Cancel delayed switch setting	2, 5, 17, 18
8	BREAKAWAY SETTING	0	0 - audio-follow-video 1 - audio breakaway	2
		1	0 - FOLLOW mode 1 - Normal mode	15
9	VIDEO / AUDIO TYPE SETTING	0 - for video	0 - CV 4 - SDI 1 - YC 5 - CV+YC 2 - YUV 6 - VGA scaler 3 - RGBS 7 - DVI	2
		1 - for audio	O0=0 – Unbalanced audio O0=1 – Balanced audio O1=0 – Digital audio O1=1 – Analog audio O4=0, O3=0, O2=0-Mono O4=0, O3=0,O2=1-Stereo	
		2 - for VGA and DVI	1 - 640X480 2 - 800X600 3 - 1024X768	
10	REQUEST VIS SETTING	Set as SETUP #, or set to 126 or 127 to request if machine has this function	0 - VIS source 1 - Input # or output # of source 2 - Vertical sync freq (Hz)	3, 4, 6, 7
11	REQUEST BREAKAWAY SETTING	Set as SETUP #, or set to 126 or 127 to request if machine has this function	0 - Request audio breakaway setting 1 - Request "FOLLOW" setting	3, 4, 6, 15
12	REQUEST VIDEO / AUDIO TYPE SETTING	Set as SETUP #, or set to 126 or 127 to request if machine has this function	0 - for video 1 - for audio 2 - for VGA	3, 4, 6
13	SET HIGHEST MACHINE ADDRESS	0 - for video 1 - for audio	Set equal to highest machine address	2
14	REQUEST HIGHEST MACHINE ADDRESS	0 - for video 1 - for audio	0	4

INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTE
#	DESCRIPTION	INPUT	OUTPUT	
15	REQUEST WHETHER SETUP IS DEFINED / VALID INPUT IS DETECTED	SETUP # or Input #	0 - for checking if setup is defined 1 - for checking if input is valid	8
16	ERROR / BUSY	For invalid / valid input (i.e. OUTPUT byte = 4 or OUTPUT byte = 5), this byte is set as the input #	0 - error 1 - invalid instruction 2 - out of range 3 - machine busy 4 - invalid input 5 - valid input	9, 25
17	RESERVED	- - - -	- - - -	10
18	RESET AUDIO	0	0	1
19	STORE AUDIO STATUS	Set as SETUP #	0 - to store 1 - to delete	2, 3
20	RECALL AUDIO STATUS	Set as SETUP #	0	2, 3
21	SET VIDEO PARAMETER	Equal to input / output number whose video parameter is to be set (0 = all)	Set as parameter value	2, 11, 24
22	SET AUDIO PARAMETER	Equal to input / output number whose gain is to be set (0 = all)	Set as parameter value	2, 11, 24
23	INCREASE / DECREASE VIDEO PARAMETER	Equal to input / output number whose video parameter is to be increased / decreased (0 = all)	0 - increase video gain 1 - decrease video gain 2 - increase contrast 3 - decrease contrast 4 - increase brightness 5 - decrease brightness 6 - increase colour 7 - decrease colour 8 - increase hue 9 - decrease hue 16 - increase H-phase 17 - decrease H-phase 18 - increase V-position 19 - decrease V-position	24
24	INCREASE / DECREASE AUDIO PARAMETER	Equal to input / output number whose parameter is to be increased / decreased (0 = all)	0 - increase output 1 - decrease output 2 - increase left output 3 - decrease left output 4 - increase right output 5 - decrease right output 6 - increase input 7 - decrease input 8 - increase left input 9 - decrease left input 10 - increase right input 11 - decrease right input	24
25	REQUEST AUDIO PARAMETER	Equal to input / output number whose parameter is requested	0	6, 24
26	REQUEST VIDEO PARAMETER	Equal to input / output number whose video parameter is requested	0	6, 24
30	LOCK FRONT PANEL	0 - Panel unlocked 1 - Panel locked	0	2
31	REQUEST WHETHER PANEL IS LOCKED	0	0	16
32 to 35	RESERVED	- - - -	- - - -	10
40	DIRECT MEMORY SAVE	Memory address	Data	20

INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTE
#	DESCRIPTION	INPUT	OUTPUT	
42	AUDIO PARAMETER SETTINGS FOR INSTRUCTIONS 22, 24, 25	INPUT Bit: I0 - 0=input; 1=output I1 - Left I2 - Right	0 - Gain 1 - Bass 2 - Treble 3 - Midrange	24
43	VIDEO PARAMETER SETTINGS FOR INSTRUCTIONS 21, 23, 26	1 – Input 2 – Output	0 - video gain 1 - contrast 2 - brightness 3 - colour 4 - hue 5 - H-phase 6 - V-position	24
56	CHANGE TO ASCII	0	1 - SVS protocol 2 - Generic protocol	19
57	SET AUTO-SAVE	I3 - no save I4 - auto-save	0	12, 2
58	EXECUTE LOADED DATA	Set as 0, or as SETUP #.	1-Take 2-Cancel	22, 3
59	LOAD VIDEO DATA	Set equal to video input (0 = disconnect) (127 = load SETUP #)	Set equal to video output (0 = to all the outputs) or SETUP #	22, 23
60	LOAD AUDIO DATA	Set equal to audio input (0 = disconnect) (127 = load SETUP #)	Set equal to audio output (0 = to all the outputs) or SETUP #	22, 23
61	IDENTIFY MACHINE	1 - video machine name 2 - audio machine name 3 - video software version 4 - audio software version 5 - RS422 controller name 6 - RS422 controller version 7 - remote control name 8 - remote software version 9 - Protocol 2000 revision	0 - Request first 4 digits 1 - Request first suffix 2 - Request second suffix 3 - Request third suffix 10 - Request first prefix 11 - Request second prefix 12 - Request third prefix	13
62	DEFINE MACHINE	1 - number of inputs 2 - number of outputs 3 - number of setups	1 - for video 2 - for audio 3 - for SDI 4 - for remote panel 5 - for RS-422 controller	14
63	EXTENDED DATA	7 MSBs for INPUT data	7 MSBs for OUTPUT data	20

NOTES on the above table:

NOTE 1 - When the master switcher is reset, (e.g. when it is turned on), the reset code is sent to the PC. If this code is sent to the switchers, it will reset according to the present power-down settings.

NOTE 2 - These are bi-directional definitions. That is, if the switcher receives the code, it will perform the instruction; and if the instruction is performed (due to a keystroke operation on the front panel), then these codes are sent. For example, if the HEX code
01	85	88	83

was sent from the PC, then the switcher (machine 3) will switch input 5 to output 8. If the user switched input 1 to output 7 via the front panel keypad, then the switcher will send HEX codes:
41	81	87	83

to the PC.
When the PC sends one of the commands in this group to the switcher, then, if the instruction is valid, the switcher replies by sending to the PC the same four bytes that it was sent (except for the first byte, where the DESTINATION bit is set high).

NOTE 3 - SETUP # 0 is the present setting. SETUP # 1 and higher are the settings saved in the switcher's memory, (i.e. those used for Store and Recall).

NOTE 4 - The reply to a "REQUEST" instruction is as follows: the same instruction and INPUT codes as were sent are returned, and the OUTPUT is assigned the value of the requested parameter. The replies to instructions 10 and 11 are as per the definitions in instructions 7 and 8 respectively. For example, if the present status of machine number 5 is breakaway setting, then the reply to the HEX code
0B	80	80	85

would be HEX codes
4B	80	81	85

NOTE 5 – For the OUTPUT byte set as 6, the VIS source is the input selected using the OUTPUT byte. Similarly, for the OUTPUT byte set as 7, the VIS source is the output selected using the OUTPUT byte. Note also, that on some machines the sync source is not software selectable, but is selected using switches, jumpers, etc!

NOTE 6 – If INPUT is set to 127 for these instructions, then, if the function is defined on this machine, it replies with OUTPUT=1. If the function is not defined, then the machine replies with OUTPUT=0, or with an error (invalid instruction code).

If the INPUT is set to 126 for these instructions, then, if possible, the machine will return the current setting of this function, even for the case that the function is not defined. For example, for a video switcher which always switches during the VIS of input #1, (and its VIS setting cannot be programmed otherwise), the reply to the HEX code

| 0A | FE | 80 | 81 (ie. request VIS setting, with INPUT set as 126$_{dec}$) |

would be HEX codes

| 4A | FE | 81 | 81 (ie. VIS setting = 1, which is defined as VIS from input #1). |

NOTE 7 – Setting OUTPUT to 0 will return the VIS source setting as defined in instruction #7. Setting to 1 will return the input # or output # of the sync source (for the case where the VIS source is set as 6 or as 7 in instruction #7). Setting to 2 returns the vertical sync frequency (0 for no input sync, 50 for PAL, 60 for NTSC, 127 for error).

NOTE 8 - The reply is as in TYPE 3 above, except that here the OUTPUT is assigned with the value 0 if the setup is not defined / no valid input is detected; or 1 if it is defined / valid input is detected.

NOTE 9 - An error code is returned to the PC if an invalid instruction code was sent to the switcher, or if a parameter associated with the instruction is out of range (e.g. trying to save to a setup greater than the highest one, or trying to switch an input or output greater than the highest one defined). This code is also returned to the PC if an RS-232 instruction is sent while the machine is being programmed via the front panel. Reception of this code by the switcher is not valid.

NOTE 10 – This code is reserved for internal use.

NOTE 11 – For machines where the video and / or audio gain is programmable.

NOTE 12 - Under normal conditions, the machine's present status is saved each time a change is made. The "power-down" save (auto-save) may be disabled using this code. Note that whenever the machine is turned on, the auto-save function is set.

NOTE 13 - This is a request to identify the switcher/s in the system. If the OUTPUT is set as 0, and the INPUT is set as 1, 2, 5 or 7, the machine will send its name. The reply is the decimal value of the INPUT and OUTPUT. For example, for a 2216, the reply to the request to send the audio machine name would be (HEX codes):

| 7D | 96 | 90 | 81 (i.e. 128$_{dec}$+ 22$_{dec}$ for 2nd byte, and 128$_{dec}$+ 16$_{dec}$ for 3rd byte). |

If the request for identification is sent with the INPUT set as 3 or 4, the appropriate machine will send its software version number. Again, the reply would be the decimal value of the INPUT and OUTPUT - the INPUT representing the number in front of the decimal point, and the OUTPUT representing the number after it. For example, for version 3.5, the reply to the request to send the version number would be (HEX codes):

| 7D | 83 | 85 | 81 (i.e. 128$_{dec}$+ 3$_{dec}$ for 2nd byte, 128$_{dec}$+ 5$_{dec}$ for 3rd byte). |

If the OUTPUT is set as 1, then the ASCII coding of the lettering following the machine's name is sent. For example, for the VS-7588YC, the reply to the request to send the first suffix would be (HEX codes):

| 7D | D9 | C3 | 81 (i.e. 128$_{dec}$+ ASCII for "Y"; 128$_{dec}$+ ASCII for "C"). |

NOTE 14 - The number of inputs and outputs refers to the specific machine which is being addressed, *not* to the system. For example, if six 16X16 matrices are configured to make a 48X32 system (48 inputs, 32 outputs), the reply to the HEX code

| 3E | 82 | 81 | 82 (ie. request the number of outputs) |

would be HEX codes

| 7E | 82 | 90 | 82 |

ie. 16 outputs

NOTE 15 – When the OVR bit (4th byte) is set, then the "video" commands have universal meaning. For example, instruction 1 (SWITCH VIDEO) will cause all units (including audio, data, etc.) to switch. Similarly, if a machine is in "FOLLOW" mode, it will perform any "video" instruction.

NOTE 16 - The reply to the "REQUEST WHETHER PANEL IS LOCKED" is as in NOTE 4 above, except that here the OUTPUT is assigned with the value 0 if the panel is unlocked, or 1 if it is locked.

NOTE 17 – For clean switching of RGBHV video, the "seamless switching" option may be used. The blanking period for the transition of the RGB sources may be set in this case, in steps of 25 milliseconds.
For example, to set for 350ms blanking time (14 steps), send HEX codes

| 07 | 8E | A0 | 81 |

NOTE 18 – Delayed execution allows switching after a delay dictated by RS-232. To do this, the user sends instruction 7 with the "Set for delayed switch" option (64_{dec}) before sending the switch command (instruction 1) or pressing via front panel. The switch is not executed (unless timed-out) until the "Execute delayed switch" code is sent, or the "Set for delayed switch" code is sent again. (The mode is automatically cancelled after implementation of the switch if the "execute" command is used).

For example, to connect input 4 to output 3 after a delay, send HEX codes

07	80	C0	81	(set for delayed switch)
01	84	83	81	(switch code)

then, after the required delay, send HEX codes

07	80	C1	81	(execute delayed switch)

to implement the switch.

NOTE 19 – After this instruction is sent, the unit will respond to the ASCII command set defined by the OUTPUT byte. The ASCII command to operate with the HEX command set must be sent in order to return to working with HEX codes.

NOTE 20 – When data (ie. the INPUT and/or OUTPUT bytes) of more than 7 bits is required, this instruction is sent before sending the instruction needing the additional bits. The data in this intruction then becomes the Most Significant Bits of that next instruction. For example, to set the audio gain (instruction 22) of output 3 to 681_{dec} ($2A9_{hex}$), you would first send HEX codes

3F	80	85	81

and then send HEX codes

16	83	A9	81.

To set the audio gain of output 6 to 10013_{dec} ($271D_{hex}$), first send HEX codes

3F	80	CE	81

followed by HEX codes

16	86	9D	81.

NOTE 21 – To store data in the non-volatile memory of the unit, eg. the EEPROM for saving SETUPS. The EEPROM address is sent using the INPUT byte, and the data to be stored is sent using the OUTPUT byte. To use this instruction, it is necessary to understand the memory map, and memory structure of the particular machine.

NOTE 22 – Instruction 59 and instruction 60 load data for sending to the crosspoint switcher (or for storing in a SETUP), ie. the data is "lined-up" to be executed later. Instruction 58 executes the loaded data.

NOTE 23 – If the INPUT byte is set as 127_{dec}, then the data stored in a SETUP is loaded. The SETUP # is in the OUTPUT byte.

NOTE 24 – Further information needed in instructions 21, 22, 25 and 26, is sent using instruction 42 – which is sent prior to the instruction. For example, to request the audio gain value of right input # 9, send hex codes

2A	84	80	81

and then send HEX codes

19	89	81	81.

NOTE 25 – For units which detect the validity of the video inputs, Instruction 16 will be sent whenever the unit detects a change in the state of an input (in real-time).

For example, if input 3 is detected as invalid, the unit will send the HEX codes

10	83	84	81

If input 7 is detected as valid, then the unit will send HEX codes

10	87	85	81.

LIMITED WARRANTY

Kramer Electronics (hereafter *Kramer*) warrants this product free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY

Labor and parts are warranted for three years from the date of the first customer purchase.

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed.
3. Damage, deterioration or malfunction resulting from:
    i)   Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
    ii)   Product modification, or failure to follow instructions supplied with the product
    iii)   Repair or attempted repair by anyone not authorized by Kramer
    iv)   Any shipment of the product (claims must be presented to the carrier)
    v)   Removal or installation of the product
    vi)   Any other cause, which does not relate to a product defect
    vii)   Cartons, equipment enclosures, cables or accessories used in conjunction with the product

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

The liability of Kramer for any effective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

NOTE: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

This equipment has been tested to determine compliance with the requirements of:

EN-50081:	"Electromagnetic compatibility (EMC);
	generic emission standard.
	Part 1: Residential, commercial and light industry"
EN-50082:	"Electromagnetic compatibility (EMC) generic immunity standard.
	Part 1: Residential, commercial and light industry environment".
CFR-47:	FCC Rules and Regulations:
	Part 15: "Radio frequency devices
	Subpart B – Unintentional radiators"

CAUTION!

⊠ Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
⊠ Use the supplied DC power supply to feed power to the machine.
⊠ Please use recommended interconnection cables to connect the machine to other components.

For the latest information on our products and a list of Kramer distributors, visit our Web site: www.kramerelectronics.com, where updates to this user manual may be found. We welcome your questions, comments and feedback.

Safety Warning: Disconnect the unit from the power supply before opening/servicing.

Caution